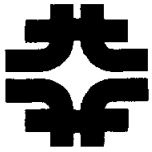

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Radiation Physics Note #31

Larry Coulson LC

Attached is a 1978 Fire Safety Subcommittee report which is used as guidance in designing programs to deal with a fire alarm in a radiation area.

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LC, What if anything → File #2... has been/should be done with this? ASR. 6.5.'80

January 30, 1978

TO: Paul Mantsch, Chairman Laboratory Safety Committee

FROM: Larry Coulson, Chairman Fire Safety Subcommittee L. Coulson

SUBJECT: SUBCOMMITTEE REPORT

Attached is my Subcommittee Report on safety considerations when a fire report or an alarm occurs in a radiation area, which our Subcommittee was asked to consider some months ago. Basically, our recommendation is that the safety considerations developed in our report be used by Department Heads/Division Leaders as a basis for developing their own detailed local plans for emergency response in these situations. We would, of course, expect that they would coordinate the development of these plans with the appropriate Laboratory emergency and safety personnel.

LC:eg

Attach.

cc:
D. Pinyan
R. Dorner
File IV.12

5/5/78
Safety Committee recommends that Rudy Dorner take this + go implement it. Letter to go from P. Mantsch to Dept/Div heads re it also.

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FIRE SAFETY SUBCOMMITTEE REPORT

Safety Considerations with Respect to Emergency Response Personnel in the Event of a Fire Report or Alarm in a Radiation Area

The Fire Safety Subcommittee was asked to consider this subject to effect an improvement in safety with respect to emergency response personnel in the event of a fire report or alarm in a controlled access area. In the past, access to an interlocked radiation area when a fire alarm occurs has occasionally been made prior to adequate hazard evaluation. For example, on one occasion interlocked gates were forced open prior to consultation with area representatives. On other occasions Fire Protection Department personnel have been permitted access under questionable conditions, (e.g., power-on accesses, accesses to areas with very high residual radiation exposure rates or to areas where radioactive contamination could have been a problem)--again prior to consultation with appropriate safety personnel. In general the atmosphere at the scene is confusion--confusion about whether entry should be made, who should be consulted before entry, what steps should be taken to reduce hazards to the entry party, and often how serious the hazards are.

Objective

The objectives of our considerations were 1) to delineate the potential hazards in interlocked areas; 2) to clarify the

responsibilities of the Emergency Response Team and area representatives; 3) to emphasize the need for, and outline some important safety considerations of the area plans for investigating and fighting fires in the interlocked enclosures.

Applicability

These considerations apply to the following areas.

1. All interlocked beam enclosures. This includes all interlocked areas of the Accelerator, Switchyard, Proton Area, Neutrino Area and the Meson Area.
2. Meson Detector Building.
3. Muon Lab and Lab E in the Neutrino Area.
4. Tagged Photon Lab in the Proton Area.
5. Neutrino Target Service Building.
6. Site 68 House

Reasons for Extra Precautions

Not all the hazards listed below exist in all the above locations, but in every case the potential for these hazards needs to be evaluated before entry is made.

1. Beam Hazard. Although the beam should go off when a door is opened, that is neither a safe nor an appropriate method of shutting the beam down.
2. Electrical Hazards. There are very serious electrical hazards in some of the enclosures, mainly from exposed electrical bus work. In addition, not all power supplies are shut down

by opening the doors.

3. Explosion Hazards. Some beam enclosures contain hydrogen targets and other explosion hazards.

4. Residual Radioactivity. Some of these areas may have very high levels of residual radioactivity which could result in excessive radiation exposures even on short duration accesses.

5. Airborne Radioactivity. Experience has shown that airborne radioactivity can be a serious problem. Even if Scott Airpacks are worn the potential exists for airborne radioactivity to be carried out on clothing where it may be ingested or carried away on the clothing of others.

Responsibilities

This section is a summary of the responsibilities of some of the personnel who would normally respond to this kind of emergency. The basis for the summary is the Laboratory Emergency Plan. The numbers in parentheses indicate the relevent section of the plan.

Division Director/Department Head (4): The Laboratory Director has delegated the responsibility for safety in the various areas to the respective Division Directors/Department Heads. In particular the responsibility for minimizing hazards, developing plans to handle emergencies and coping with emergencies lies with the Division Directors/Department Heads.

Area Emergency Supervisor (5): The Area Emergency

Supervisor is responsible for being aware of hazards, developing emergency plans (to be approved by the Division Directors/Department Head). Usually the Area Emergency Supervisor (or his alternate) represents the Division Director/Department Head at the scene of the emergency. Frequently he is the area representative in charge at the scene. As such, he will be the person who must evaluate the situation, make decisions and initiate control measures.

Emergency Coordinator (3): The Emergency Coordinator will normally play a supportive role supplying communication and coordinating activities. He may, however, at any time exercise his prerogative and assume command.

Fire Department (7): The Fire Department has the responsibility to conduct all fire fighting operations. They depend on the Area Emergency Supervisor and safety representatives, to make the "go or no-go" decision on entry and to advise them of non-fire hazards.

Local Area Plans

In general, local emergency plans do not deal adequately with procedures to be followed in the event a fire alarm occurs in an interlocked area. Local plans should be improved and updated to be more specific for this category of emergencies. As per the Laboratory Emergency Plan, the Area Emergency Supervisor should develop such plans. In developing the plans it is suggested that the logic diagram in Fig. 1 (or a modification of it) be considered as the skeleton around which to

build the plans.

Figure 1 represents the various kinds of circumstances which may be encountered and indicates the logical sequence of events based on the decisions which are made. Several features of this diagram are discussed below.

(1) The first decision which must be made is which of the conditions A1, A2, or A3 exists. That is, is a false alarm suspected, fire suspected or a fire known to exist? Some of the considerations for each case are listed beside the boxes. We are not as concerned with how this decision is made as we are that the person authorized to make the decision is well defined. The person specified may depend on the enclosure involved due to the degree of personnel hazard or potential dollar loss.

(2) Following the initial assessment, the next decision which must be made in each case is whether access will be made to investigate or if operation will be resumed without investigation. Perhaps, as before, the person who has that authority may depend on the enclosure involved. To be considered are such things as possible programmatic impact, potential dollar losses, potential hazards to personnel if an entry is made or if entry is not made, etc. The point is that regardless of which decision is made some degree of risk is assumed. The personnel authorized to assume these risks should be well identified in the local plans.

The committee members feel that as the degree of risk which must be assumed increases these kinds of decisions should be made by higher level personnel in the Dept./Div. At first glance some of the options at this point may not appear as valid, for example, the decision to not make an entry or to delay entry to an area where a fire is known or even suspected. However, in most cases such a decision is justified. For example, if it is known that "no serious damage can be done; or whatever damage that could be done is already done, or very high levels of residual radioactivity may be encountered, or other serious personnel hazards may exist" then delaying entry until safety personnel have been contacted is justified and in fact should be encouraged. These are the "go or no-go" decisions pointed out in the Laboratory Emergency Plan which should be in local plans.

(3) At B2, under False Alarm Suspected, access may be made under normal access conditions allowed for that enclosure. However, at B4, B6, and B7 it is felt that radiation safety personnel should be consulted before entry. The reason is that in general an assessment of residual radiation levels which may be encountered should be made as well as the potential for airborne radioactivity, etc. Perhaps this requirement is not necessary for all interlocked enclosures since some interlocked enclosures never contain radiation hazards except when the beam is on. Other enclosures are always hot enough to require this precaution while some only occasionally have serious potential

radiation hazards. If any enclosures are to be exempted from this restriction, the plan should so state. If enclosures exist which may or may not be exempted, those enclosures should be noted as well as the conditions for exempting them.

(4) At B6 and B7, i.e., when a fire is known to exist, the committee feels that controlled access is inappropriate and any access procedure should require that interlocks be dropped before entry. More generally, any entry made when Scott Air Packs are worn should be with interlocks opened and all power off. This is because of the limited visability, flexibility and confusion which accompanies such entries.

In the other two cases - false alarm suspected or fires suspected, it may be reasonable to make a controlled access. Even in these cases power-on access should be discouraged and should not be permitted if Scott Air Packs are worn.

(5) D4, D7, D10, and E1 (Page 2 of Fig. 1) local plans should require that before making an entry either to investigate or fight a fire, all reasonable steps should be taken to reduce the hazards to entry personnel. For example, reasonable effort must be made to reduce electrical, explosion and radiation hazards. More generally, the person in charge at the scene is responsible for making a hazard evaluation before entry is made. This again emphasizes the need for clear statements of responsibility as the degree of hazard (assumed risk) increases. It is felt that in nearly all interlocked enclosures the amount to be gained by quick entries does not justify a high risk of

accident, injury or incident caused by the entry. There should always be time to reduce hazards and consult with appropriate safety personnel before entry.

(6) At D5, D8, D11, and E2 we are emphasizing the need for consideration of who enters the enclosures, careful instruction about likely hazards, and setting up "go or no-go" (return) criteria. The choice of personnel may very well depend on the nature and degree of hazards which exist or are likely to exist in the enclosure.

Under most circumstances initial entry personnel should be one fire fighter and one person from the area who is well acquainted with the potential non-fire hazards, can make evaluation of the degree of hazard encountered and is well enough instructed that he can make decisions about "when to continue" or "when to return".

This combination of personnel may not be possible (or reasonable) if a fire is known to exist due to an understandable reluctance of available area personnel to enter an enclosure under these conditions. Local plans should state under what conditions area personnel will be permitted or expected to accompany fire fighters on the initial entry and at what point later they may be allowed to enter. In reviewing the local plan Division Directors/Department Heads should be aware that fire fighters are not allowed to make unaccompanied accesses to areas where dose rates are expected to exceed 10 rem/hr. This means that in such areas no accesses will be made until radiation safety personnel arrive to supervise the initial

entry and subsequent fire fighting efforts.

(7) At D13, local plans for clean-up after fire should accommodate the necessity of "preserving evidence" if the dollar loss is high enough to be classified as a Type A or Type B incident which must be reported to DOE.

Recommendations

(1) Division Directors/Department Heads should be asked to develop more detailed emergency plans which are directed toward the problems outlined in this report. As indicated in the Laboratory Emergency Plan the Area Emergency Supervisors should develop these plans and have them validated by the Division Directors/Department Heads and the Emergency Coordinator.

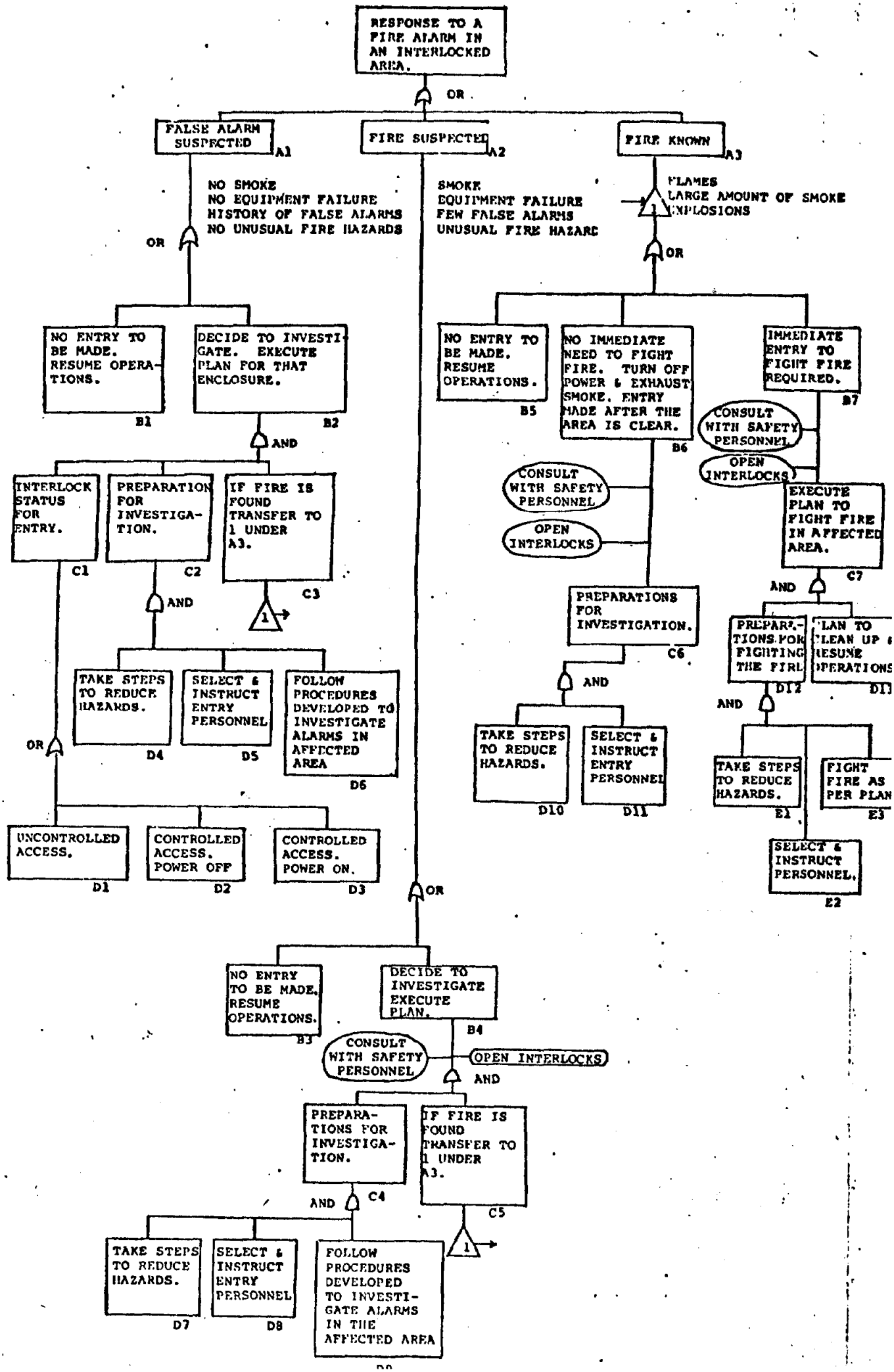
(2) Up-to-date access restrictions and information about unusual hazards should appear on the Firus fire alarm printout. This information would be useful to Area and Fire Department personnel when responding to the emergency. The information should be developed and kept current by each area. The Area Emergency Supervisor would be a logical person to do this.

(3) So that fire fighters are not entirely dependent on area personnel for knowledge of the areas and potential hazards, we recommend the Fire Chief take the following steps:

(a) He should make sure his personnel are acquainted with all the enclosures, the normal or expected hazards therein, area personnel who are likely to be in charge at the time of an emergency, and the local emergency plans as discussed above.

(b) The Fire Chief should develop "run cards" (or the equivalent) which provide information about expected hazards, access restrictions, etc., for each enclosure.

(4) Fire Department personnel should be instructed never to crash through interlocked gates except in life saving situations. The proper procedure for them should be to await the arrival of area personnel. The area representative will normally be in charge and advise the Fire Department as to whether entry is necessary. If entry is necessary, the fire fighters will be advised of safe entry procedures by the area representative in charge. In case of doubt, they should contact other safety personnel (Radiation Physics, Safety Office, etc.) for advice.


RESPONSE TO A FIRE ALARM IN AN INTERLOCKED AREA.
OR
FALSE ALARM SUSPECTED
A1
FIRE SUSPECTED
A2
FIRE KNOWN
A3
NO SMOKE
NO EQUIPMENT FAILURE
HISTORY OF FALSE ALARMS
NO UNUSUAL FIRE HAZARDS
SMOKE
EQUIPMENT FAILURE
FEW FALSE ALARMS
UNUSUAL FIRE HAZARD
FLAMES
LARGE AMOUNT OF SMOKE
EXPLOSIONS
OR
NO ENTRY TO BE MADE. RESUME OPERATIONS.
B1
DECIDE TO INVESTIGATE. EXECUTE PLAN FOR THAT ENCLOSURE.
B2
AND
INTERLOCK STATUS FOR ENTRY.
C1
PREPARATION FOR INVESTIGATION.
C2
IF FIRE IS FOUND TRANSFER TO 1 UNDER A3.
C3
AND
TAKE STEPS TO REDUCE HAZARDS.
D4
SELECT & INSTRUCT ENTRY PERSONNEL
D5
FOLLOW PROCEDURES DEVELOPED TO INVESTIGATE ALARMS IN AFFECTED AREA
D6
OR
UNCONTROLLED ACCESS.
D1
CONTROLLED ACCESS. POWER OFF
D2
CONTROLLED ACCESS. POWER ON.
D3
NO ENTRY TO BE MADE. RESUME OPERATIONS.
B5
NO IMMEDIATE NEED TO FIGHT FIRE. TURN OFF POWER & EXHAUST SMOKE. ENTRY MADE AFTER THE AREA IS CLEAR.
B6
IMMEDIATE ENTRY TO FIGHT FIRE REQUIRED.
B7
CONSULT WITH SAFETY PERSONNEL
OPEN INTERLOCKS
CONSULT WITH SAFETY PERSONNEL
OPEN INTERLOCKS
EXECUTE PLAN TO FIGHT FIRE IN AFFECTED AREA.
C7
AND
PREPARATIONS FOR INVESTIGATION.
C6
AND
TAKE STEPS TO REDUCE HAZARDS.
D10
SELECT & INSTRUCT ENTRY PERSONNEL
D11
PREPAR-TIONS FOR FIGHTING THE FIRE
D12
PLAN TO CLEAN UP & RESUME OPERATIONS
D13
AND
TAKE STEPS TO REDUCE HAZARDS.
E1
FIGHT FIRE AS PER PLAN
E3
SELECT & INSTRUCT PERSONNEL.
E2
OR
NO ENTRY TO BE MADE. RESUME OPERATIONS.
B3
DECIDE TO INVESTIGATE EXECUTE PLAN.
B4
CONSULT WITH SAFETY PERSONNEL
OPEN INTERLOCKS
AND
PREPARA-TIONS FOR INVESTIGA-TION.
C4
IF FIRE IS FOUND TRANSFER TO 1 UNDER A3.
C5
AND
TAKE STEPS TO REDUCE HAZARDS.
D7
SELECT & INSTRUCT ENTRY PERSONNEL
D8
FOLLOW PROCEDURES DEVELOPED TO INVESTI-GATE ALARMS IN THE AFFECTED AREA
D9